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NOTES ON THE BEHAVIOR OF THE DOMESTIC FOWL¹

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DURING the month of February, 1909, the writer's attention was called to an interesting feature of the behavior of a buff rock cockerel kept in the poultry department of the Rhode Island State College at Kingston, Rhode Island. Having briefly described the facts of the case to Dr. Robert M. Yerkes of the Department of Psychology of Harvard University, and having been informed by him that the behavior in question was somewhat noteworthy, the writer has collected data, secured photographs, and desires to present the following description, believing it may be of interest to students of animal behavior. The point of behavior under consideration consists in the acquired habit of an adult barred rock cockerel of "working" an automatic feeder, containing bran and grain, located in one of the colony houses of the poultry department, and by this action of securing a larger amount of the grain constituent than the feeder, working by itself, would naturally be able to supply.

The automatic feeder in question is of a type manufactured by John Anderson, of Slocums, Rhode Island, and involves mainly a box (Fig. 1, *B*) containing feed, and a tray (*T*) suspended beneath it. The dimensions of the box are roughly sixteen by eleven by eight inches. The food material escapes from the box through a narrow opening at the back and bottom of the feeder, and is caught in the tray, which is thirteen inches long by seven and one half inches broad, and is suspended eleven inches from the floor. The supply of food material falling on the tray is regulated by a balance system. The tray is so

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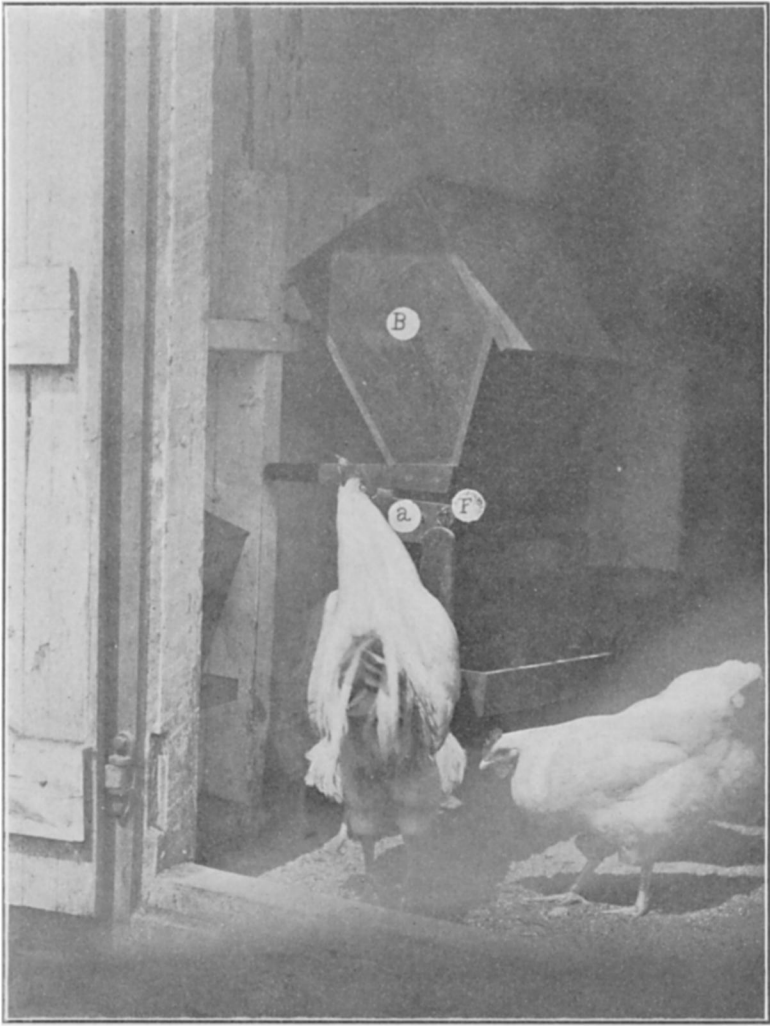


FIG. 1.

suspended from the point *F* that, when it is lightened (consequent to feeding), it rises and simultaneously admits a new supply of food material from the box. As soon as a sufficient amount to increase the weight of the tray has fallen, the latter drops again and automatically shuts off the supply. This process of filling and empty-

ing continues as long as there is material left in the box and there are fowls to eat from the tray.

The material contained in the automatic feeder is usually a mixture of bran, wheat, and whole corn. While both the hens and the cockerel eat a fair amount of the bran constituent, they like the grain, especially the whole corn, much better. This predilection is exhibited especially by the cockerel, which attempts to obtain a minimum amount of the bran and a maximum amount of the corn. Usually there are from four to eight hens, together with the cockerel, attempting to feed from the tray at the same time. As a consequence, the grain, which is mixed with the bran, is in the tray but a short time before it is eaten, and nothing but the bran remains. When this condition has come about the cockerel proceeds to "work" the feeder. This is accomplished in the following manner.

As shown in Fig. 1, the cockerel while eating almost invariably stands at the left-hand corner of the feeder. At this point he usually feeds from the corner of the tray, while the hens feed from both sides or from the ends, some of them standing between the feed-tray and the wall, where there is a free space of ten and one half inches. As soon as the corn has all been eaten the cockerel steps back sufficiently to clear the corner of the tray, takes a few steps forward around the corner, raises its head high and gives a vigorous push or peck to the beam designated (*a*) in Fig. 1. The force of this blow usually serves to throw out the board slat which holds the food back in the box; and, as a result, fresh material falls upon the tray, the increased weight of which immediately closes this outlet from the box. As soon as more corn has fallen on the tray the cockerel hastily returns to his former position at the corner of the tray and devours as many of the kernels as possible before the hens have again cleared the receptacle of grain; whereupon the cockerel again leaves the tray and pecks the beam. The final result of this continuous performance is that the tray be-

comes so heavily stocked with the bran constituent that it will not longer work automatically, sometimes becoming so heavy that even the most vigorous pecks of the cockerel no longer serve to raise it and admit more food.

The movements of the cockerel in working the feeder are, as a whole, characterized by directness and accuracy. Occasionally, however, there is a slight hesitation in striking the beam. In such a case the bird leaves the tray and turns toward the beam, but returns to the tray before having struck, as if influenced by the thought that grain had already entered the tray or that the other birds would secure it first. This hesitation is usually followed, however, by the complete successful performance. The accuracy of the strike is noteworthy, and a deep groove has been worn on the edge of the beam at the point where the beak strikes.

The cockerel mentioned above is a fine specimen of the buff rock variety. It was hatched at the Rhode Island College Poultry Plant in February, 1908, and now measures twenty-three inches in height. The bird has been confined in the colony house (with appended yard) for about four months, and the type of behavior described had been observed about two months before it came to the notice of the writer. It thus seems probable that the bird had been in the house with the feeder accessible for about two months before the trick was learned. At the time of writing (April 5, 1909) the cockerel still has access to the automatic feeder and works it regularly every day.

Since making the observations recorded in the preceding paragraphs the writer has secured other data which show that the ability to work the automatic feeders is not restricted to the previously mentioned buff rock cockerel alone, but is also possessed by several of the hens located in the same colony house, and by another white Orpington cockerel in an adjoining poultry house. While the behavior of the white Orpington cockerel is in most respects similar to that of the buff rock, the action of the buff rock hens is somewhat different. When the

hens feed from the tray, a few of them, as has been remarked, stand back of the automatic feeder, *i. e.*, between it and the wall, a space of about ten and one-half inches. In this position the feed tray is slightly more than breast high (thirteen and one-half inches) at the top of the rim, while slightly above the head of the birds (nineteen inches from the floor and six inches from tray) runs a guide-board, eleven by two and one-half inches. This board, which really serves as a guide to the food falling from the box into the feed-tray, is so hung that if it be struck from behind outward the effect is the same as that of striking the beam (*a*) at the point designated; that is, the grain is let into the feed-tray. Striking the guide-board from before does not accomplish this result. Now it appears that several of the hens have learned the trick of operating the supply by striking from behind, with their bills, the guide-board designated above. To accomplish this the bird merely needs to raise its head from the tray and to stretch its neck slightly in order to reach the board which is sharply pecked. It appears, however, that the hens do not attempt this manœuvre so often as the cockerel performs the other. This is perhaps for two reasons: first, the hens do not care so much for the grain; and secondly, the cockerel is apparently always quite ready to save the hens the trouble of working the feeder for themselves.

How long was required for the hens to learn the trick of operating the feeder is not known; nor are any data at hand regarding the proficiency shown at successive stages in the process of learning. When the performance was first observed by the writer the technique was already perfected. It would be interesting to learn how, in the experience of the cockerel, the connection was first made between the movement of the beam and the presence of fresh corn on the tray. The matter would be easier of explanation were the action in question one which, on the first performance, could easily have been accomplished by chance, as, for instance, the case of the dog or cat acci-

dentally striking the latch when leaping or pawing at the door for admittance. In the present instance there is performed an action which requires the cockerel to leave temporarily the primary object of his attention, and to perform a manœuvre which it seems could hardly have been hit upon accidentally, while the bird was engaged in the process of feeding.

Since writing the above paragraphs the writer has made other observations which add new interest to the subject in hand. In order to prevent the buff rock cockerel from working the feeder a piece of sheet tin was nailed to the beam which had been struck. This was placed over the beam in such a way as to protect the latter on the top, where the cockerel had usually struck it, as well as on the sides. This sheet of tin extended downward to within about one-eighth of an inch of the bottom of the beam, and hung about one-fourth of an inch outside of the same. Thus the whole of the beam, except one-eighth of an inch of the lower margin, was protected from the beak of the cockerel, and it was expected that this precaution would effectually prevent all further "working" of the feeder. This result, however, was not forthcoming, for within two days after the sheet of tin had been placed on the feeder the cockerel was found to have modified his behavior to suit the new unfavorable conditions. Now, instead of attempting to strike the beam from above, as previously, he reached with his beak underneath the projecting sheet of tin, and, grasping the lower margin of the beam, bore it downward with a kind of pulling motion from beneath. This movement, it is apparent, is somewhat different from the one first described. It is, moreover, the only means by which the feeder could possibly be worked by manipulating any accessible part of beam. It is barely possible to consider the second manœuvre as a direct modification of the first, although a different part of the beam is struck, and with a different movement on the part of the bird. It is diffi-

cult to see how this second reaction could have been developed as a result of an accidental success, especially when it is borne in mind that the manœuvre was first initiated and fully perfected within two days of the time when manœuvre number one was discontinued. Whether manœuvre number two is a modification of number one, whether it arose from imitation (which is doubtful, since no person or other fowl is known to have performed the action before it was perfected by the cockerel), or whether it is the result of a chance success following random movements, the writer is not prepared to state. Notwithstanding the fact that manœuvre number two is so different from number one, it is perhaps more reasonable to assume tentatively the correctness of the first hypothesis. But this does not explain the origin of manœuvre number one, although it surely demonstrates a very effective modifiability in the behavior of the cockerel. In the present instance it is also noteworthy, perhaps, that when the first manœuvre was prevented by the presence of the sheet of tin, the cockerel did not profit by an imitation of the hens, which continued to work the feeder from behind as in the first case mentioned above.

Believing that there are certain theoretical considerations arising from the foregoing observations which would be of interest to comparative psychologists, the writer has requested Doctor Yerkes to add hereto comments that seem pertinent to the question in hand. The writer would also take this occasion to express his thanks to Mr. Roy H. Waite, Assistant in Biology, for preparing the photograph which accompanies this paper; also to Mr. Holden, of the College poultry plant, for some of the data here presented.

COMMENT UPON DR. HADLEY'S OBSERVATIONS

Neither casual observation nor systematic experimentation with the domestic fowl has furnished many instances of the type of behavior described by Dr. Hadley. Consequently his observations have considerable interest and value for students of animal behavior.

It is scarcely necessary to say that the most serious defect in this account

of the behavior of a cockerel is the lack of the history of the formation of the habit. This defect is the author's misfortune, as well as the reader's, but it is not his fault, inasmuch as the habit was practically perfect when he first observed it. To attempt to interpret the behavior in psychic terms or to point out its significance would be futile in the absence of definite knowledge of the conditions which originally gave rise to it. This is but one of the innumerable instances in which we need more facts instead of speculation.

Dr. Hadley has suggested that the connection between pecking the beam of the feeder and obtaining grain could not have been discovered accidentally. Should he succeed in proving the truth of this supposition he would make an important contribution to animal psychology, for it is fair to say that the habit arose either from "accident" or from ideas. Evidently the author himself suspects that ideas, or some other forms of psychic process, had to do with the acquisition of the food-getting act. I wish the facts were adequate to prove or disprove this possibility. They are not, in my opinion, and it is therefore out of place to discuss them from that point of view.

The reader can but wonder whether the hens which operate the feeder acquired their method of obtaining grain under the influence of imitation. The conditions apparently furnish an excellent opportunity for the experimental study of imitation in fowls.

Surely the wisest and safest, if not the most satisfying, comment which the student of animal behavior can make concerning Dr. Hadley's observations is "let additional facts appear before interpretation is permitted."

ROBERT M. YERKES.